



Europäisches Patentamt

European Patent Office

Office européen des brevets

(11) Publication number:

0 131 700

A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 84104976.0

(51) Int. Cl. 4: H 01 F 15/02

(22) Date of filing: 03.05.84

H 01 F 15/04, H 01 F 19/08

(30) Priority: 09.05.83 IT 3402383 U

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(43) Date of publication of application:
23.01.85 Bulletin 85/4

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(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

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(54) Switch mode transformer having a ferrite core.

(57) An SMT-type transformer comprises a ferrite core formed of two complementary portions mirror-symmetrically joined to one another, and a body including a primary and a secondary winding supported on one of the legs of the core. The two core portions are retained in the assembled condition by a retaining cage (7) preferably formed of a ferromagnetic material and having a top surface (8) engaging one core portion (5), and a plurality of legs (9) extending from the top surface and having end portions (10, 11) adapted to be bent into engagement with the other core portion (6). Integrally formed with the legs are annular portions (12) surrounding the winding body (1) so as to constitute a short-circuit winding therearound.

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1 SMT-Type Transformer Having a Ferrite Core

Description

**TITLE MODIFIED
see front page**

5 The present invention relates to a transformer of the so-called SMT (Switch Mode Transformer) type having a ferrite core. The primary and secondary windings of a transformer of this type are usually wound in a concentric arrangement around one leg of a so-called "open" ferrite core substantially consisting of two E- or C-shaped portions joined to one another in a mirror-symmetrical arrangement. In prior art, the two core portions have usually been adhesively joined, as by the use of a suitable adhesive and/or adhesive tape, or secured to one another by means 5 of screws and suitable clamping members.

In the case of SMT-type transformers the need is generally recognized to reduce the extension of the electric field (with the resulting dispersions) in the surrounding environment, to eliminate RF interferences. This effect is obtained by disposing a short-circuit winding (normally made of copper) coaxially with the windings around the magnetic circuit of the transformer.

5 The assembly of the ferrite core and of the short-circuit winding obviously has to be carried out in two separate phases, whereby the assembly of the transformer as a whole is rendered undesirably complex.

) It is therefore an object of the present invention to provide an SMT-type transformer having a ferrite core, which is of sturdy and functional construction, and the assembly of which is simple and rational, lending itself to automatization.

This object is attained according to the invention by an SMT-type transformer having a ferrite core one leg of which carries a primary and a secondary winding, the ferrite core

1 comprising at least two complementary portions mirror-symmetrically joined to one another.

The transformer is mainly characterized in that it further
5 comprises a retaining cage formed with a top surface
adapted to cooperate with one portion of the core, a
plurality of legs extending from the sides of the top
surface and having free end portions adapted to be bent
into engagement with the other portion of the core, so that
10 the two complementary core portions are clamped within the
cage between the top surface thereof and the end portions
of the legs.

The characteristics and advantages of the invention will
15 become more clearly evident from the following description
of an exemplary embodiment with reference to the accompanying
drawings, the only figure of which shows a perspective
view of a transformer according to the invention, partially
in cross-section.

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An SMT-type transformer shown in the figure comprises a body 1 formed of a primary and a secondary winding, the terminals 2 of which are clamped in a per se known manner in a support body 3. Body 1 is wound on a central leg (not shown) of a ferrite core 4 formed of at least two complementary portions 5 and 6 mirror-symmetrically joined to one another. In the example shown, the two portions 5 and 6 are substantially E-shaped, although they may also be of other configurations as required.

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The two portions 5 and 6 are joined to one another in abutting relationship as generally known, so that body 1 of the transformer and support body 3 are imprisoned on the central leg of the core. According to the invention, 35 the two portions of the core are secured in position by means of a retaining cage 7 which may be formed of a pre-shaped components as for instance by punching.

- 1 Cage 7 is preferably of a ferromagnetic material and includes a top surface 8 adapted to cooperate with the upper end of core portion 5.
- 5 Downwards extending from the sides of top surface 8 are a plurality (four in the embodiment described) of legs 9 the free end portions of which are adapted to be bent into engagement with the lower end of core portion 6.
- 10 To this end the free end portions of legs 9 are formed with suitable tabs 10 (shown before bending) and 11 (shown after having been bent).

The facility of assembly of the entire transformer is clearly evident, particularly as far as it concerns the manufacture of cage 7 which may readily be formed and mounted in position in an automatized process, as stated as the object of the invention.

- 20 According to another aspect of the invention, cage 7 is integrally formed with annular portions 12 extending between legs 9 so as to surround the windings 1 of the transformer.
- 25 Annular portions 12, two of which are preferably provided diametrically opposite one another, effectively constitute a short-circuit winding limiting the dispersions of the electric field in the environment of the transformer in the known manner. As cage 7 is made of a ferromagnetic material, 30 the short-circuit winding is also effective to limit the dispersion of the magnetic field of the transformer.

With the sole operation of mounting retainer cage 7 it is thus possible to achieve the assembly of the ferrite core 35 as well as the limitation of the dispersions of the electric and magnetic fields.

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EP 1547

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SMT-Type Transformer Having a Ferrite Core

Patent Claims

- 25 1. An SMT-type transformer having a ferrite core one leg of which carries a primary and a secondary winding, said ferrite core comprising at least two complementary portions mirror-symmetrically joined to one another, characterized in that it further comprises a retaining cage (7) formed with a top surface (8) adapted to cooperate with one portion (5) of said core (4), a plurality of legs (9) extending from the sides of said top surface and having free end portions (10, 11) adapted to be bent into engagement with the other portion (6) of said core, so that the two complementary core portions are clamped within said cage between said top surface (8) and the end portions of said legs (9).

1 2. An SMT-type transformer as claimed in claim 1,
characterized in that said retaining cage (7) is made of
a ferromagnetic material and includes integrally formed
annular portions (12) extending between said legs (9) and
5 forming a short-circuit winding around said windings (1)
of the transformer.

3. An SMT-type transformer as claimed in claim 1 or 2,
characterized in that the free end portions of said legs (9)
10 are formed with tabs (10, 11) adapted to be bent into
engagement with said core (4).

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